

Application No. 10/664,301
 Docket No. 2002U023.US
 Reply to Office Action Dated July 21, 2006
 RCE dated: October 26, 2006

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Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A process of preparing an mixed catalyst system, comprising:
 - (a) combining a High MFR (I_{21}) Catalyst with an activator and a support to form an activated High MFR catalyst system; and
 - (b) combining
 - (i) a diluent comprising a mineral or silicon oil with the activated High MFR catalyst system to form a first support slurry, followed by combining a Low MFR (I_{21}) Catalyst with the first support slurry; or
 - (ii) a diluent comprising a mineral or silicon oil and a Low MFR Catalyst to the activated High MFR catalyst system;

wherein the Low MFR Catalyst is combined with the activated supported High MFR Catalyst in the substantial absence of additional activator, wherein the High MFR Catalyst consists essentially of a cyclic bridged metallocene described by the following formula:



wherein A is a divalent group bound to each of L^A and L^B ; each of L^A and L^B are bound to M, and each Q is bound to M;

L^A and L^B are independently selected from the group consisting of cyclopentadienyl ligands or substituted cyclopentadienyl ligands;

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wherein A is a divalent bridging group comprising a heterocyclic ring comprising from 3 to 6 carbon atoms and one silyl, thus forming a 4 to 7 member divalent ring;

M is zirconium or hafnium; wherein n is 1 or 2; and

Q is chlorine or fluorine; and

wherein the Low MFR Catalyst consists essentially of a bridged metallocene compound described by the following formula:



where R¹ and R² are each bound to E, and E is bound to each of L^A and L^B, each of L^A and L^B are bound to M, and each Q is bound to M;

L^A and L^B are independently selected from the group consisting of cyclopentadienyl ligands and substituted cyclopentadienyl ligands;

wherein the R¹R²E group forms a divalent bridging group, wherein E is silicon;

wherein R¹ and R² are C₁ to C₅ alkyls;

M is zirconium or hafnium; wherein n is 1 or 2; and

Q is chlorine or fluorine

2. (Currently Amended) The process of Claim 1, wherein the High MFR catalyst is ~~a cyclic bridged metallocene; the cyclic bridged metallocene~~ characterized in that it is capable of producing polyethylene with an MFR of 50 dg/min or more when activated and is the only catalyst present in a reaction mixture that includes ethylene monomers and is subjected to a gas phase polymerization; and wherein the Low MFR catalyst is ~~a bridged metallocene; the bridged metallocene~~ characterized in that it is capable of producing polyethylene with an MFR of less than 50 dg/min when activated and is the only catalyst present in a reaction mixture that includes ethylene monomers and is subjected to a gas phase polymerization.

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3. (Original) The process of claim 1, wherein the activated supported High MFR catalyst system is formed by combining the components in (a) in a first diluent having a boiling point of less than 200°C.
4. (Original) The process of Claim 3, comprising the step of removing the first diluent prior to step (b).
5. (Cancelled)
6. (Cancelled)
7. (Original) The process of claim 1, wherein the High MFR Catalyst is capable of producing polyethylene with an MFR of 40 or more when the High MFR Catalyst is the only catalyst present in a reaction mixture that includes ethylene monomers that are subjected to a gas phase polymerization in the presence of the High MFR Catalyst.
8. (Original) The process of claim 1, wherein the High MFR Catalyst is capable of producing polyethylene with an MFR of 60 or more when the High MFR Catalyst is the only catalyst present in a reaction mixture that includes ethylene monomers that are subjected to a gas phase polymerization in the presence of the High MFR Catalyst.
9. (Original) The process of claim 1, wherein the Low MFR Catalyst is a metallocene capable of producing polyethylene with an MFR of less than 45 when the Low MFR Catalyst is the only catalyst present in a reaction mixture that includes ethylene monomers that are subjected to a gas phase polymerization in the presence of the Low MFR Catalyst.

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10. (Original) The process of claim 1, wherein the Low MFR Catalyst is capable of producing polyethylene with an MFR of less than 40 when the Low MFR Catalyst is the only catalyst present in a reaction mixture that includes ethylene monomers that are subjected to a gas phase polymerization in the presence of the Low MFR Catalyst.
11. (Currently Amended) The process of claim 1, wherein the Low MFR Catalyst is a ~~metallocene~~ capable of producing polyethylene with a melt strength (MS) of 6 or more.
12. (Cancelled)
13. (Cancelled)
14. (Original) The process of claim 1, wherein the activator comprises methylaluminoxane.
15. (Original) The process of claim 1, wherein the support comprises silica.
16. (Original) The process of claim 1, wherein the diluent is a blend of a mineral or silicon oil and a hydrocarbon selected from the group consisting of C₁ to C₁₀ alkanes, C₆ to C₂₀ aromatic hydrocarbons, C₇ to C₂₁ alkyl-substituted hydrocarbons, and mixtures thereof.
17. (Original) The process of Claim 16, wherein the diluent comprises from 10 to 100 wt%, by weight of the diluent, of mineral oil.
18. (Original) The process of Claim 1, wherein the molar ratio of the low MFR Catalyst metal center to high MFR Catalyst metal center ranges from 2:1 to 1:3.

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19. (Original) The process of Claim 1, wherein the activated supported High MFR catalyst system and first diluent are heated from 25 to 150°C prior to combining the Low MFR Catalyst.

20-46. (Cancelled)

47. (New) The process of claim 1, wherein said High MFR catalyst is silylcyclopentyl(tetramethylcyclopentadienyl)(cyclopentadienyl) zirconium dichloride, and wherein said Low MFR Catalyst dimethylsilyl(2,3,5-trimethylcyclopentadienyl)(cyclopentadienyl)zirconium dichloride.
48. (New) The process of claim 1, wherein said High MFR catalyst consists of silylcyclopentyl(tetramethylcyclopentadienyl)(cyclopentadienyl) zirconium dichloride, and wherein said Low MFR Catalyst consists of dimethylsilyl(2,3,5-trimethylcyclopentadienyl)(cyclopentadienyl)zirconium dichloride.
49. (New) A process of preparing a mixed catalyst system, comprising:
- (a) combining a High MFR (I_{21}) Catalyst with an activator and a support to form an activated High MFR catalyst system; and
 - (b) combining
 - (i) a diluent comprising a mineral or silicon oil with the activated High MFR catalyst system to form a first support slurry, followed by combining a Low MFR (I_{21}) Catalyst with the first support slurry; or
 - (ii) a diluent comprising a mineral or silicon oil and a Low MFR Catalyst to the activated High MFR catalyst system;
- wherein the Low MFR Catalyst is combined with the activated supported High MFR Catalyst in the substantial absence of additional activator, wherein the High

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MFR Catalyst consists of a cyclic bridged metallocene described by the following formula:



wherein A is a divalent group bound to each of L^A and L^B ; each of L^A and L^B are bound to M, and each Q is bound to M;

L^A and L^B are independently selected from the group consisting of cyclopentadienyl ligands or substituted cyclopentadienyl ligands;

wherein A is a divalent bridging group comprising a heterocyclic ring comprising from 3 to 6 carbon atoms and one silyl, thus forming a 4 to 7 member divalent ring;

M is zirconium or hafnium; wherein n is 1 or 2; and

Q is chlorine or fluorine; and

wherein the Low MFR Catalyst consists of a bridged metallocene compound described by the following formula:



where R^1 and R^2 are each bound to E, and E is bound to each of L^A and L^B ; each of L^A and L^B are bound to M, and each Q is bound to M;

L^A and L^B are independently selected from the group consisting of cyclopentadienyl ligands and substituted cyclopentadienyl ligands;

wherein the $R^1 R^2 E$ group forms a divalent bridging group, wherein E is silicon;

wherein R^1 and R^2 are C_1 to C_3 alkyls;

M is zirconium or hafnium; wherein n is 1 or 2; and

Q is chlorine or fluorine.

50. (New) A process of preparing a mixed catalyst system, consisting of:
- (a) combining a High MFR (I_{21}) Catalyst with an activator and a support to form an activated High MFR catalyst system; and
 - (b) combining

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- (i) a diluent comprising a mineral or silicon oil with the activated High MFR catalyst system to form a first support slurry; followed by combining a Low MFR (L_{21}) Catalyst with the first support slurry; or
- (ii) a diluent comprising a mineral or silicon oil and a Low MFR Catalyst to the activated High MFR catalyst system;

wherein the Low MFR Catalyst is combined with the activated supported High MFR Catalyst in the substantial absence of additional activator, wherein the High MFR Catalyst consists of a cyclic bridged metallocene described by the following formula:



wherein A is a divalent group bound to each of L^A and L^B ; each of L^A and L^B are bound to M, and each Q is bound to M;

L^A and L^B are independently selected from the group consisting of cyclopentadienyl ligands or substituted cyclopentadienyl ligands;

wherein A is a divalent bridging group comprising a heterocyclic ring comprising from 3 to 6 carbon atoms and one silyl, thus forming a 4 to 7 member divalent ring;

M is zirconium or hafnium; wherein n is 1 or 2; and

Q is chlorine or fluorine; and

wherein the Low MFR Catalyst consists of a bridged metallocene compound described by the following formula:



where R^1 and R^2 are each bound to E, and E is bound to each of L^A and L^B ; each of L^A and L^B are bound to M, and each Q is bound to M;

L^A and L^B are independently selected from the group consisting of cyclopentadienyl ligands and substituted cyclopentadienyl ligands;

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wherein the R^1R^2E group forms a divalent bridging group, wherein E is silicon;
wherein R^1 and R^2 are C_1 to C_3 alkyls;
M is zirconium or hafnium; wherein n is 1 or 2; and
Q is chlorine or fluorine.